

US009636718B2

(12) United States Patent

Chiang et al.

(54) MASK CLEANING APPARATUS AND MASK CLEANING METHOD

(71) Applicant: **BOE TECHNOLOGY GROUP CO.,**

LTD., Beijing (CN)

(72) Inventors: Kelvin Chiang, Beijing (CN); Peng

Zhang, Beijing (CN)

(73) Assignee: **BOE TECHNOLOGY GROUP CO.**,

LTD., Beijing (CN)

(*) Notice: Subject to any disclaimer, the term of this

patent is extended or adjusted under 35

U.S.C. 154(b) by 0 days.

(21) Appl. No.: 14/904,221

(22) PCT Filed: Apr. 24, 2015

(86) PCT No.: **PCT/CN2015/077368**

§ 371 (c)(1),

(2) Date: Jan. 11, 2016

(87) PCT Pub. No.: **WO2016/101462**

PCT Pub. Date: Jun. 30, 2016

(65) Prior Publication Data

US 2016/0214149 A1 Jul. 28, 2016

(30) Foreign Application Priority Data

Dec. 24, 2014 (CN) 2014 1 0817986

(51) Int. Cl. *B08B 7/00*

(2006.01)

B08B 7/**02** (2006.01)

(Continued)

(52) U.S. Cl.

(2013.01)

(10) Patent No.: US 9,636,718 B2

(45) **Date of Patent:**

May 2, 2017

(58) Field of Classification Search

CPC B08B 7/0021; B08B 7/028; B24C 1/00 (Continued)

(56) References Cited

U.S. PATENT DOCUMENTS

2009/0098309 A1 4/2009 Brody et al. 2011/0265815 A1 11/2011 Mitake et al.

2012/0247504 A1* 10/2012 Nasr B08B 7/0035

134/1.1

FOREIGN PATENT DOCUMENTS

CN 2443788 Y 8/2001 CN 1822905 A 8/2006

(Continued)

OTHER PUBLICATIONS

Second Chinese Office Action mailed Aug. 2, 2016. (Continued)

Primary Examiner — Duy Deo Assistant Examiner — Maki Angadi (74) Attorney, Agent, or Firm — Dilworth & Barrese,

(57) ABSTRACT

LLP.; Michael J. Musella

A mask cleaning apparatus and a mask cleaning method are provided. The mask cleaning method comprises: placing a mask (100) on a stage (20); and ejecting a dry ice particle group including a plurality of dry ice particles (101) toward a surface of the mask (100) at a speed of 340 m/s to 1000 m/s, within a cleaning time, wherein the plurality of dry ice particles (101) impact the surface of the mask (100) so as to remove a contaminant on the surface of the mask. Thereby, the mask cleaning apparatus and the mask cleaning method provided by embodiments of the present disclosure can remove the contaminant on the mask, without increasing a contamination medium and damaging the surface of the mask.

20 Claims, 2 Drawing Sheets

